

Appl. No.: 10/713,241  
Amdt. Dated: July 15, 2004  
Reply to Office Action of: May 4, 2004

The listing of claims will replace all prior versions, and listings, of claims in the application:

1. **(Original)** A photonic band-gap crystal optical waveguide comprising: a photonic band-gap crystal having a pitch and; a defect, including a core, said defect having a boundary that encloses a plane cross section and a length dimension perpendicular to the plane cross section, the defect boundary including a plurality of protrusions.
2. **(Original)** The photonic band-gap crystal optical waveguide of claim 1, wherein said defect has a structure such that the mode power fraction confined to said core is not less than 0.6.
3. **(Original)** The photonic band-gap crystal optical waveguide of claim 1, wherein said boundary is selected such that the mode power fraction confined to said core is not less than 0.6.
4. **(Original)** The photonic band-gap crystal optical waveguide of claim 1, wherein: said boundary is being characterized by a numerical value and the numerical value is selected so that the wavelength of the localized mode produced by the defect propagates in the wavelength range of the photonic band-gap; and the ratio of the numerical value of said defect to the pitch is selected to avoid the excitation of surface modes within the photonic band-gap.
5. **(Original)** The photonic band-gap crystal optical waveguide of claim 1, wherein: said boundary is being characterized by a perpendicular distance from defect center to the nearest point on the boundary, said distance being such that: (i) that the wavelength of the localized mode produced by the defect propagates in the wavelength range of the photonic band-gap; and the ratio of the distance to the pitch is selected to avoid the excitation of surface modes within the photonic band-gap.

6. **(Original)** The photonic band-gap crystal optical waveguide of claim 5, wherein said distance is selected so that the mode power fraction confined to the core is not less than 0.6.
7. **(Original)** The photonic band-gap crystal optical waveguide of claim 1, wherein said band-gap crystal optical waveguide is an optical fiber, said plurality of protrusions being a plurality of ribs situated along the core surface; and said boundary is being characterized a numerical value, said numerical value being the distance from core center to the nearest point on one of said ribs.
8. **(Original)** The photonic band-gap crystal optical waveguide of claim 7, wherein, said core has refractive index lower than the refractive index of material immediately surrounding said core.
9. **(Original)** The photonic band-gap crystal optical waveguide of claim 1 wherein, said defect has a circular cross section plane with said plurality of ribs protruding from the defect boundary, said boundary is being characterized a numerical value and the numerical value is the radius of the circular cross section measured to the ribs.
10. **(Original)** The photonic band-gap crystal optical waveguide according to any of the preceding claims, wherein the number of said protrusions is 6.times.N, where N is a positive integer.
11. **(Currently Amended)** The photonic band-gap crystal optical waveguide of claim 1, wherein said waveguide is single mode waveguide, said defect having a circular cross section with the protruding ribs, said defect boundary is being characterized ~~as~~ the distance from the center of said cross-section to the nearest point on said boundary, and, for a mode power fraction confined to core of not less than 0.6, the ratio of said distance to pitch has a range from about 0.6 to 2.5.

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12. **(Original)** The photonic band-gap crystal optical waveguide of claim 11, wherein the mode power fraction confined to said core is not less than 0.75.

13. **(Original)** The photonic band-gap crystal optical waveguide of claim 1 wherein, said defect is a core having a hexagonal cross section plane, the mode power fraction confined to said core is not less than 0.6 and the defect boundary being characterized by a numerical value, wherein the numerical value is the length of a line drawn from the center of the hexagonal cross-section perpendicular to a side of the hexagon, and, the ratio of the numerical value to pitch has a range from 0.6 to 2.5.

14. **(Currently Amended)** The photonic band-gap crystal optical waveguide of claim 13 12, wherein the mode power fraction confined to said core is not less than 0.75.

15. **(Original)** The photonic crystal optical band-gap waveguide comprising: photonic band-gap crystal having a pitch; and a defect, including a core, said defect having a boundary that encloses a plane cross section and a length dimension perpendicular to the plane cross section, the defect boundary (i) including a plurality of protrusions and (ii) being characterized by at least one numerical value, wherein said numerical value is measured from defect center to the closest point on said boundary.

16. **(Currently Amended)** The photonic band-gap crystal optical waveguide of claim 15 14, wherein the mode power fraction confined to said core is not less than 0.6.

17. **(Currently Amended)** The photonic band-gap crystal optical waveguide of claim 15 14, wherein the number of said protrusions is  $6 \times N$ , where N is a positive integer.